

Japanese Kokai Patent Application No. P2003-72835A

---

Job No.: 2454-104077

Ref.: JP2003072835A

Translated from Japanese by the McElroy Translation Company  
800-531-9977 customerservice@mcelroytranslation.com

JAPANESE PATENT OFFICE  
PATENT JOURNAL  
KOKAI PATENT APPLICATION NO. P2003-72835A

Int. Cl. <sup>7</sup> :	B 65 D 73/02 85/86 H 05 K 13/02 H 65 D 85/38
Filing No.:	P2001-265501
Filing Date:	September 3, 2001
Publication Date:	March 12, 2003
No. of Claims:	9 (Total of 8 pages; OL)
Examination Request:	Not filed

CARRIER RIBBON FOR ELECTRONIC MEMBERS AND METHOD FOR ASSEMBLING  
ELECTRONIC MEMBERS

Inventors:	Toshiyuki Miyata Micro-Electronics Center, Toshiba Corp. 1 Komukaitoshiba-cho, Saiwai-ku, Kawasaki-shi, Kanagawa-ken  Koji Koga Micro-Electronics Center, Toshiba Corp. 1 Komukaitoshiba-cho, Saiwai-ku, Kawasaki-shi, Kanagawa-ken
Applicant:	000003078 Toshiba Corp. 1-1-1 Shibaura, Minato-ku, Tokyo
Agent:	100097629 Hisashi Takemura, patent attorney

[There are no amendments to this patent.]

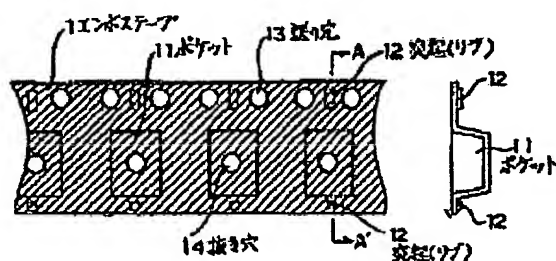
## Abstract

### Problem

To provide a type of carrier ribbon for electronic members and a method for assembling electronic members characterized by the fact that it is not necessary to adjust the position of the rail of the assembling machine corresponding to the thickness of the emboss ribbon, and the constitution ensures that zigzagging does not occur when the carrier ribbon wound on a reel is fed.

### Constitution

On a carrier ribbon, which has electronic members accommodated on it and transported, emboss ribbon (1) that forms the carrier ribbon has protrusions (12) formed on it at prescribed regions. Because the protrusions are added to the thickness of the emboss ribbon, it is not necessary to adjust the height of the rail of the assembling machine (position adjustment). Also, because the protrusions reinforce the emboss ribbon, it is possible to prevent zigzagging when the carrier ribbon wound on a reel is fed. In addition, because the carrier ribbon is processed while pockets are formed in the embossing operation, the manufacturing process can be simplified.



Key:	1	Emboss ribbon
	11	Pocket
	12	Protrusion (rib)
	13	Feeding hole
	14	Vent hole

## Claims

1. A type of carrier ribbon for electronic members characterized by the following facts: it has an emboss ribbon having plural pockets for accommodating electronic members formed on it; and at least one protrusion is formed in the region outside the region where said pockets are formed.

2. The carrier ribbon for electronic members described in Claim 1 characterized by the fact that plural feeding holes are formed along at least one edge of the two edges of said emboss ribbon.

3. The carrier ribbon for electronic members described in Claim 2 characterized by the fact that said protrusions are formed between said plural feeding holes.

4. The carrier ribbon for electronic members described in Claim 2 characterized by the fact that said protrusions are formed between said pockets and said plural feeding holes.

5. The carrier ribbon for electronic members described in Claim 4 characterized by the fact that said protrusions are formed in a strip shape.

6. The carrier ribbon for electronic members described in Claim 1 characterized by the fact that said protrusions are formed along the two edges of said emboss ribbon.

7. The carrier ribbon for electronic members described in any of Claims 1-6 characterized by the fact that a cover ribbon is laminated on said emboss ribbon to seal off said pockets.

8. The carrier ribbon for electronic members described in Claim 7 characterized by the fact that said emboss ribbon is wound on a reel.

9. A method of assembling of electronic members characterized by the fact that it has the following steps of operation:

a step in which an assembling substrate is set at a prescribed position;

and a step in which a prescribed electronic member fetched from said carrier ribbon for electronic members described in Claim 8 is set at the prescribed position on said assembling substrate.

#### Detailed explanation of the invention

[0001]

##### Technical field of the invention

The present invention pertains to the structure of a carrier ribbon that accommodates liquid crystal display elements, elastic surface wave elements, resistors, coils, capacitors, and other passive elements for semiconductor devices, mobile devices, and cell phones, as well as printed circuit boards, and other completed products of electronic parts, and transports them for use in an assembly operation of the members on assembling substrates.

[0002]

##### Prior art

In the prior art, completed products of the BGA (Ball Grid Array) type and other semiconductor devices as electronic members are transported by means of a carrier ribbon for assembling on assembling substrates with an assembling machine. The carrier ribbon has a

structure composed of an emboss ribbon having pockets formed on it as product accommodating portions and a cover ribbon applied to cover the emboss ribbon. The emboss ribbon is formed by vacuum molding, press molding or compressed air molding of polystyrene or another plastic sheet. On the ribbon, pockets for accommodating the electronic members and feeding holes for feeding the ribbon are formed at a prescribed pitch. The shape is defined in a JIS standard (JIS C0806).

[0003]

Figure 12 is a plan view of the emboss ribbon forming the carrier ribbon for electronic members in the prior art. Figure 13 is a cross-sectional view of the carrier ribbon for electronic members in the prior art. The carrier ribbon for electronic members has emboss ribbon (101) made of polystyrene sheet or the like having pockets (110) for accommodating electronic members (105), and cover ribbon (102) that is superimposed on emboss ribbon (101) to seal off the pockets with electronic members accommodated in them. It is wound on a reel made of polystyrene or the like. The end portions of wound cover ribbon (102) and emboss ribbon (101) are fixed with an adhesive tape. Electronic member (105), such as a BGA type semiconductor device, has a silicon chip consisting of an integrated circuit or other semiconductor elements sealed with epoxy resin or another molding resin (resin sealant) (107), with ball terminals (106) exposed on one surface. The other surface is the labeled portion with numbers, letters, and other symbols marked on it. Emboss ribbon (101) has plural pockets (110) formed in the central portion, and vent holes (air vent holes) (111) formed at nearly the center of the bottom surface of pockets (110). Also, feeding holes (109) for feeding the ribbon are formed on the two sides of emboss ribbon (101). Pocket (110) is formed a little larger than electronic member (105) to allow easy entry and exit [of the electronic member].

[0004]

Cover ribbon (102) is formed from polyethylene terephthalate (PET) or another laminating sheet, and it has a width selected appropriately to ensure that it is positioned on the inner side of feeding holes (109) of emboss ribbon (101). The adhesive tape is made of polypropylene (PP) or the like and has an attached adhesive. For an emboss ribbon for accommodating electronic members of small size, feeding holes may be set only on one side. When electronic members (105) are accommodated and packed in the carrier ribbon, the carrier ribbon is released from a ribbon machine, an electronic member is accommodated in each pocket (110) such that ball terminals (106) of electronic member (105) are in touch with the bottom of pocket (110). Then, cover ribbon (102) is heat sealed on the surface of the carrier ribbon. Then,

the result is wound on a reel, and the final end portion is bonded with an adhesive tape to complete the package (see Figure 13).

[0005]

Problems to be solved by the invention

For the mounting machine (M/C) having members accommodated on the carrier ribbon in the prior art, when the electronic members are taken from the carrier ribbon and are assembled on assembling substrates, the height of the reel (this height is adjusted to define a prescribed spacing between the ribbon feeding roll set beneath a rail and the rail) should be adjusted corresponding to the thickness of the carrier ribbon so as to eliminate bumping of the carrier ribbon and the rail. That is, in the prior art, when the carrier ribbon is thin, the rail height of the assembling machine is reduced. When the carrier ribbon is thick, the rail height is increased. As a result, bumping of the reel can be avoided. In this way, before the mounter and assembling machine are turned ON, it is necessary to adjust the height of the reel corresponding to an initially determined ribbon thickness. However, adjustment of the position of the assembling machine is a difficult job. Also, for the carrier ribbon, there is a tendency to decrease the ribbon thickness to reduce the waste quantity to protect the environment and to cut the price of products.

[0006]

Also, the emboss ribbon for the carrier ribbon for electronic members is formed by molding a plastic sheet or the like with vacuum molding, press molding, compressed air molding, etc. On the sheet, pockets for accommodating electronic members and feeding holes for feeding the ribbon are formed at a prescribed pitch. Plural pockets in a recess shape with dimensions a little larger than the width, length and height of the electronic member are formed. As shown in Figure 9, when the ribbon is wound as a spiral winding (long ribbon winding) on a reel, depending on the material of the ribbon, zigzagging may occur, so that the carrier ribbon becomes deviated from the reel portion of the M/C or assembling machine, leading to a shutdown of mounter M/C, etc. during the ribbon feeding process. As a means to address this problem, one has to adopt a material with higher strength for the ribbon, or has to increase the thickness of the ribbon to prevent zigzagging. This is undesired. The objective of the present invention is to solve the aforementioned problems of the prior art by providing a type of carrier ribbon for electronic members and a method for assembling electronic members characterized by the fact that it is not necessary to adjust the position of the rail of the assembling machine corresponding to the thickness of the emboss ribbon, and the constitution ensures that no zigzagging occurs when the carrier ribbon wound on the reel is fed.

[0007]

Means to solve the problems

The present invention provides a type of carrier ribbon for electronic members characterized by the following facts: the carrier ribbon for electronic members holds ball terminal integrated circuits, and other semiconductor devices, liquid crystal display elements for mobile devices and cell phones, elastic surface wave elements, resistors, coils, and other passive elements, printed circuit boards, and other completed products of electronic members, etc., and transports them; and protrusions (ribs) with a prescribed height are formed at prescribed regions where pockets of the emboss ribbon that forms the carrier ribbon are not formed. Because the height of the protrusions is not added to the thickness of the emboss ribbon, it is not necessary to adjust the height of the reel of the assembling machine (position adjustment), and the protrusions can reinforce the emboss ribbon. Consequently, it is possible to prevent zigzagging when the carrier ribbon wound on the reel is fed. Also, for the carrier ribbon for electronic members, when processing is performed together with the process of formation of pockets, the manufacturing process can be simplified.

[0008]

That is, the present invention provides a type of carrier ribbon for electronic members characterized by the following facts: it has an emboss ribbon having plural pockets for accommodating electronic members formed on it; and at least one protrusion is formed in the region outside the region where said pockets are formed. Plural feeding holes may be formed along at least one edge of the two edges of said emboss ribbon. Said protrusions may be formed between said plural feeding holes. Said protrusions may be formed between said pockets and said plural feeding holes. Said protrusions may be formed in strip shape. Said protrusions may be formed along the two edges of said emboss ribbon. A cover ribbon may be laminated on said emboss ribbon to seal off said pockets. Said emboss ribbon may be wound on a reel. Also, the present invention provides a method of assembling of electronic members characterized by the fact that it has the following steps of operation: a step in which an assembling substrate is set at a prescribed position; and a step in which a prescribed electronic member fetched from said carrier ribbon for electronic members is set at the prescribed position on said assembling substrate.

[0009]

Embodiment of the invention

In the following, an explanation will be given regarding embodiment of the present invention with reference to figures. First of all, Application Example 1 of the present invention will be explained with reference to Figures 1-7. Figure 1 is an oblique view of a carrier ribbon

for electronic members wound on a reel. Figure 2 is an oblique view of an electronic member accommodated in the carrier ribbon. Figure 3 is an oblique view of an electronic member other than the electronic member shown in Figure 2. Figure 4 includes a plan view of the emboss ribbon and a cross-sectional view taken across A-A' of the plan view. Figure 5 is a side view of a portion of an assembling machine for transporting the carrier ribbon to an assembling substrate and for removal of the electronic member from the carrier ribbon. Figure 6 is a partial cross-sectional view taken across A-A' of Figure 5. Figure 7 is a plan view as seen from above the assembling machine shown in Figures 5 and 6.

[0010]

The carrier ribbon that accommodates and transports semiconductor devices, liquid crystal display elements for mobile devices and cell phones, elastic surface elements, resistors, capacitors, coils and other passive elements, printed circuit boards and other completed products of electronic parts is composed of emboss ribbon (1) made of polystyrene sheet or the like and having pockets (11) for accommodating electronic members (5) (Figure 2), and cover ribbon (2) superimposed on emboss ribbon (1) to seal off pockets (11) accommodating electronic members (5). Emboss ribbon (1) with cover ribbon (2) superimposed on it is wound on reel (3) made of polystyrene or the like. The end portions of wound cover ribbon (2) and emboss ribbon (1) are fixed with adhesive tape (4) (Figure 1). The thickness of emboss ribbon (1) is about 0.25 mm.

[0011]

As shown in Figure 1, cover ribbon (2) is formed from polyethylene terephthalate (PET) or another laminating sheet or the like with an appropriate width to ensure that it is within the feeding holes of emboss ribbon (1). Adhesive tape (4) is made of polypropylene (PP) or another material with an attached adhesive. Electronic members (5), such as BGA type semiconductor devices, are prepared by sealing silicon chips of integrated circuits or other semiconductor elements with molding resin sealing body (7) made of epoxy resin or the like, with ball terminals (6) exposed on one surface of resin sealing body (7). Each electronic member (5) is protected with resin sealing body (7), and, on the other surface of resin sealing body (7), there is a labeled portion (8) with numbers, letters, and other marks on it (Figure 2).

[0012]

According to the present invention, in addition to the BGA type semiconductor devices, etc., accommodated electronic members can also include QFP (Quad Flat Package) type semiconductor devices as shown in Figure 3 (Figure 3(a)). This is called a surface assembling type package, with leads led out from the 4 side surfaces of the resin sealing body, and it has a

caterpillar shape. Also, there are the LOC (Lead On Chip) type semiconductor devices (Figure 3(b)). This type of semiconductor device has leads set on a chip by wire bonding, and it has a small package size. The leads are led out from two side surfaces of the resin sealing body. Also, there are the SOJ (Small Outline J-lead package) type semiconductor devices (Figure 3(c)). The leads are led out from the two side surfaces of the resin sealing body to allow surface assembly on a wiring substrate or other assembling substrate. The leads are bent down at an intermediate location by 90°. The tips of the bent leads are bent in a J shape towards the bottom surface of the resin sealing body.

[0013]

The present invention is characterized by the fact that protrusions with a prescribed thickness are formed on the emboss ribbon in regions free of pockets. In this application example, as shown in Figure 4, protrusions (12) are formed on the two sides of emboss ribbon (1). Protrusions (12) are formed between feeding holes (13) on the side where feeding holes (13) are set as a row, and they are formed between the ribbon edge and pockets (11) on the side without feeding holes (13). As shown in Figure 4, for the emboss ribbon (1) central portion, plural packets (11) are formed, and on the bottom of each pocket (11), vent hole (air vent hole) (14) is formed. Pocket (11) is designed to be a little larger than the size of electronic member (5) so as to facilitate entry and exit of the electronic member.

[0014]

In the following, with reference to Figures 5 and 6, an explanation will be given regarding the method for assembling the electronic members on assembling substrates using the carrier ribbon for electronic members. The carrier ribbon for electronic members has electronic members accommodated in the pockets of the carrier ribbon by means of a mounter (M/C), and is wound up on a reel. In this state, product transportation and substrate assembling are performed. The assembling machine for assembling the electronic members on the assembling substrates has a reel installation part for the reel having the carrier ribbon for electronic members wound up on it, a ribbon feeding part for taking the carrier ribbon for electronic members from the reel, and a member manipulating part having a suction head that removes the electronic members from the carrier ribbon for electronic members and sets them on the assembling substrates. Figure 5 is a diagram illustrating the ribbon feeding part and member manipulating part of the assembling machine. Mounter M/C for winding the carrier ribbon for electronic members on the reel has a reel installing part for installing the reel, a ribbon winding part for winding the carrier ribbon for electronic members on the reel, and a member manipulating part having a suction head for accommodating the electronic members on the carrier ribbon for

electronic members. The carrier ribbon for electronic members is driven while it is guided on the reel and a ribbon feeding roller having the same structure as that of the assembling machine. In this application example, the operation of the assembling machine is explained. The operation is the same for the mounter M/C.

[0015]

As shown in Figure 5, from the reel (not shown in the figure) installed on the assembling machine, emboss ribbon (1) that forms the carrier ribbon for electronic members is pulled out by a ribbon feeding part. The ribbon feeding part is composed of rail (10) (also called ribbon pressing cover) and ribbon feeding roller (16). The carrier ribbon for electronic members wound on the reel has ribbon feeding hooks (15) of ribbon feeding roller (16) successively engaged in feeding holes (13) of emboss ribbon (1), so that the ribbon is fed forward (in the right arrow direction) from the reel. At the tip of released emboss ribbon (1), suction head (9) that forms the member manipulating part attached to the assembling machine is set, so that electronic members (5) accommodated in pockets (11) of emboss ribbon (1) are sequentially set on assembling substrates (not shown in the figure).

[0016]

As shown in Figure 7, rails (10) are for controlling the movement of the ribbon. Emboss ribbon (1) driven with ribbon feeding hooks (15) is pressed on both sides with ribbon feeding roller (16) to ensure stable running of the ribbon. At this time, because the spacing between rails (10) and ribbon feeding roller (16) is equal to the thickness of emboss ribbon (1), it is possible to prevent bumping between rails (10) and emboss ribbon (1) in running. As aforementioned, the spacing between the rails and the ribbon feeding roller for stable feeding of the ribbon to mounter M/C and to the assembling machine in the prior art has to be changed corresponding to the thickness of the carrier ribbon running between them. That is, when the carrier ribbon is thin, the rail height of the assembling machine should be reduced. However, in recent years, there has been a high demand for reducing the load on the environment, and the carrier ribbon has been thinned in consideration of the cost. In order to meet such demand, carrier ribbons with different thicknesses are often used. On the other hand, adjustment of the rail height of the assembling machine is a difficult job, and this operation should be avoided as much as possible.

[0017]

In this application example, said undesired operation is not needed, because protrusions (12) are formed on emboss ribbon (1) that forms the carrier ribbon. The sum of the height of protrusions (12) and the thickness of emboss ribbon (1) is equal to the spacing (d) between rails

(10) and ribbon feeding roller (16), so that bumping between the carrier ribbon and rails (10) can be avoided. By forming protrusions in a prescribed shape corresponding to the prescribed spacing between the rails and the ribbon feeding roller, a carrier ribbon with any thickness can be installed on an assembling machine (same in the case of mounter M/C) adjusted to a prescribed spacing, and the assembling operation can be performed without performing said difficult operation of adjustment.

[0018]

In the following, an explanation will be given regarding Application Example 2 with reference to Figures 8 and 9. Figure 8 includes a plan view of an emboss ribbon and a cross-sectional view taken across A-A' of the plan view. Figure 9 is an oblique view of a reel having the emboss ribbon as the carrier ribbon for electronic members wound on it. In this application example, as shown in Figure 9, emboss ribbon (25) is wound spirally on reel (26). In the case of this winding, depending on the surface and thickness of the ribbon, zigzagging may take place, the carrier ribbon may deviate from the rails of the mounter M/C and assembling machine, and the machine may be shut down during feeding. As measures for solving this problem in the prior art, one may change the type of material to that with a higher strength or may increase the thickness so as to increase the strength to prevent zigzagging. In this application example, the carrier ribbon that accommodates and transports the completed products of the electronic members is composed of emboss ribbon (25) made of polystyrene sheet or the like and having pockets (21) that accommodate electronic members, and cover ribbon that superimposes on emboss ribbon (25) to seal off pockets (21) that accommodate the electronic members. Emboss ribbon (25) with the cover ribbon superimposed on it is wound on a reel made of polystyrene or the like. The cover sheet is formed from polyethylene terephthalate (PET) or another laminating material with a width selected appropriately to ensure that it is positioned on the inner side of feeding holes (23) on emboss ribbon (25). The adhesive tape is made of polypropylene (PP) or the like with an attached adhesive.

[0019]

The present invention is characterized by the fact that protrusions are formed in the region where pockets are not formed on the emboss ribbon, and the protrusions have a strip shape. In this application example, as shown in Figure 8, protrusions (12) are formed on the two sides of emboss ribbon (1). Protrusions (12) are formed along the two sides of the ribbon, and, on the side where the feeding holes are formed, they are formed between feeding holes (23) and pockets (21). On the side without the feeding holes, they are set between the ribbon edge and pockets (21). For emboss ribbon (25), in the central portion, plural pockets (21) are formed. On

the bottom of each pocket (21), at nearly the center, vent hole (air vent hole) (24) is formed. Pockets (21) are formed with a size a little larger than that of the electronic members so as to facilitate entry/exit of the electronic members. In this application example, because protrusions in a prescribed shape are formed corresponding to a prescribed spacing between the rails and the ribbon feeding roller, for a carrier ribbon with any thickness, it is possible to perform the assembly operation by installing on an assembling machine (same in the case of mounter M/C) adjusted to a prescribed spacing without performing the difficult operation of adjustment of the spacing between the rails and the ribbon feeding roller. Also, when strip shaped protrusions are formed on the carrier ribbon, the ribbon is reinforced, and it is possible to prevent zigzagging of the carrier ribbon.

[0020]

In the following, an explanation will be given regarding Application Example 3 of the present invention with reference to Figure 10. For the emboss ribbon of the carrier ribbon for electronic members in the aforementioned application examples, feeding holes are formed only on one side. According to the present invention, it is possible to set the feeding holes on the two sides of the ribbon. In this application example, the feeding holes are formed on the two sides of the ribbon. Whether the feeding holes are formed on both sides or one side of the ribbon depends on the size of the ribbon pockets. When the pockets are larger, that is, when the chip size is larger, feeding holes are usually formed on the two sides of the ribbon. The sizes of the protrusions on the two sides may be different from each other. However, the protrusions may have the same height. Also, it is not necessary for the pitch of the feeding holes to agree with that of the pockets. As shown in Figure 10, for emboss ribbon (35), plural pockets (31) are formed in the central portion, and, on the bottom of each pocket (31), at nearly the center, vent hole (air vent hole) (34) is formed. Pockets (31) are a little larger than the electronic members so that the electronic members can enter and exit easily.

[0021]

In this application example, it is not necessary to perform the difficult operation of adjustment of the spacing between the rails for transporting the carrier ribbon and the ribbon feeding roller. For this purpose, protrusions (32) are formed on emboss ribbon (35) that forms the carrier ribbon. The sum of the height of protrusions (32) and the thickness of emboss ribbon (35) is equal to the spacing between the rails and the ribbon feeding roller, so that bumping between the carrier ribbon and the rails can be avoided. As long as the protrusions in a prescribed shape are formed corresponding to the prescribed spacing between the rails and the ribbon feeding roller, for a carrier ribbon of any thickness, it is possible to perform the assembly

operation without the aforementioned difficult operation by simply installing it on the assembling machine (same in the case of mounter M/C) adjusted to the prescribed spacing. Protrusions (32) are formed in the pitch between feeding holes (33).

[0022]

In the following, with reference to Figure 11, an explanation will be given regarding the method for manufacturing the emboss ribbon that forms the carrier ribbon for electronic members explained in the aforementioned application examples. Figure 11 includes a schematic cross-sectional view of the mold in manufacturing the emboss ribbon, and an enlarged cross-sectional view of the mold. The emboss ribbon for use in the carrier ribbon for electronic members is made of polystyrene or another plastic sheet by vacuum molding, press molding, compressed air molding, etc. In the following, an explanation will be given regarding the vacuum molding method shown in the figure. A sheet made of polystyrene or the like is released from a reel, and is fed to a heated and rotated mold (loading of sheet). While the sheet is heated in the mold, evacuation is performed on the mold to perform molding along the shape of the mold. By means of this molding operation, pockets are formed at a prescribed pitch, and, at the same time, the protrusions explained in the application examples are also formed. The sheet formed into the emboss ribbon is wound up on a winding reel. The emboss ribbon wound on the reel has electronic members accommodated in the pockets, and it is then laminated with a cover ribbon, followed by winding up on another reel. Then, the end is closed with an adhesive tape, and the packing is finished.

[0023]

Effect of the invention

According to the present invention, by forming protrusions on the emboss ribbon, even for a thinner ribbon, it is still not necessary to perform the operation of adjustment of the rail height for the mounter and the packaging machine. Also, since the protrusions reinforce the emboss ribbon, it is possible to ensure that no zigzagging takes place when the carrier ribbon wound on the reel is fed. Also, the carrier ribbon for electronic members can simplify the manufacturing process, because processing is performed at the same time as the embossing operation for forming the pockets.

#### Brief description of the figures

Figure 1 is an oblique view of the carrier ribbon for electronic members of Application Example 1 of the present invention wound on a reel.

Figure 2 is an oblique view of an electronic member accommodated in the carrier ribbon for electronic members shown in Figure 1.

Figure 3 is an oblique view of the electronic members other than the electronic member shown in Figure 2 and accommodated in the carrier ribbon of the present invention.

Figure 4 includes a plan view of the emboss ribbon that forms the carrier ribbon for electronic members of Figure 1, and a cross-sectional view taken across A-A' of said plan view.

Figure 5 is a partial side view of the assembling machine that transports the carrier ribbon for electronic members in Application Example 1 of the present invention explained above to the assembling substrate, and removes the electronic members from the carrier ribbon.

Figure 6 is a cross-sectional view taken across A-A' in Figure 5.

Figure 7 is a plan view as seen from above the assembling machine shown in Figures 5 and 6.

Figure 8 includes a plan view of the emboss ribbon that forms the carrier ribbon for electronic members of Application Example 2 of the present invention, and the cross-sectional view taken across A-A' of the plan view.

Figure 9 is an oblique view of the reel having the carrier ribbon for electronic members of Figure 8 wound on it.

Figure 10 includes a plan view of the emboss ribbon that forms the carrier ribbon for electronic members in Application Example 3 of the present invention and a cross-sectional view taken across A-A' of the plan view.

Figure 11 is a schematic diagram illustrating the manufacturing method of the emboss ribbon used in Application Examples 1-3 of the present invention.

Figure 12 is a plan view of an emboss ribbon that forms a carrier ribbon in the prior art.

Figure 13 is a cross-sectional view of the carrier ribbon for electronic members in the prior art.

#### Explanation of symbols

1, 25, 35, 101	Emboss ribbon
2, 102	Cover ribbon
3, 26	Reel
4	Adhesive tape
5, 105	Electronic member
6, 106	Ball terminal
7, 107	Resin sealing body
8	Label portion
9	Suction head

10	Rail (ribbon pressing cover)
11, 21, 31, 110	Pocket
12, 22, 32	Protrusion (rib)
13, 23, 33, 109	Feeding hole
14, 24, 34, 111	Vent hole
15	Ribbon feeding hook
16	Ribbon roller

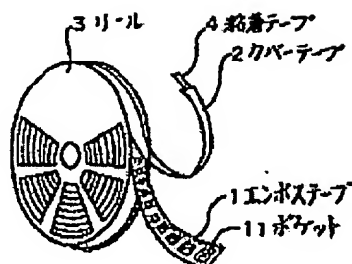


Figure 1

Key:	1	Emboss ribbon
	2	Cover ribbon
	3	Reel
	4	Adhesive tape
	11	Pocket

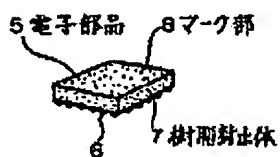


Figure 2

Key:	5	Electronic member
	7	Resin sealing body
	8	Label portion

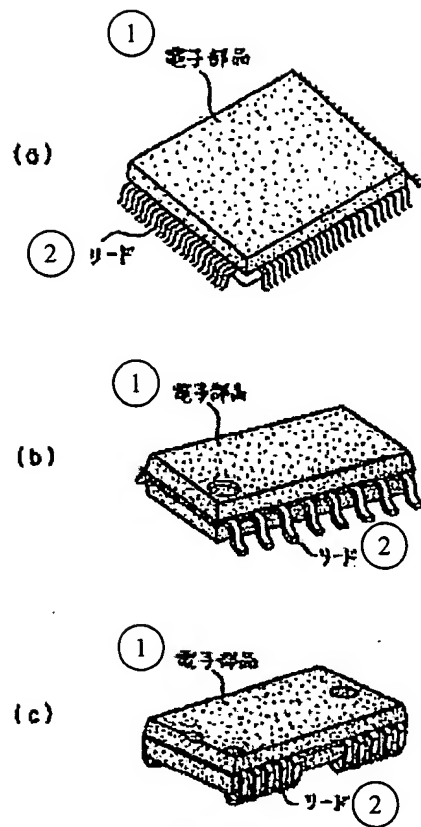


Figure 3

Key: 1 Electronic member  
 2 Lead

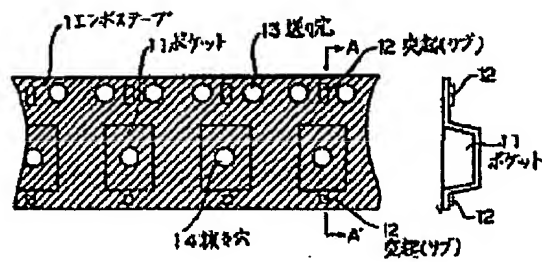


Figure 4

Key: 1 Emboss ribbon  
 11 Pocket  
 12 Protrusion (rib)  
 13 Feeding hole  
 14 Vent hole

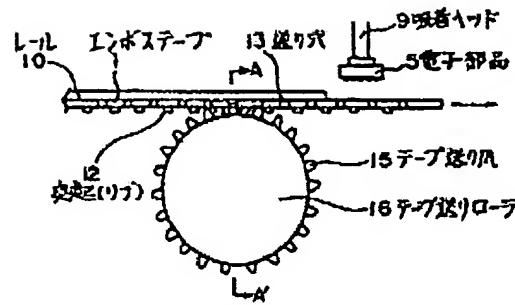


Figure 5

- Key: 1 Emboss ribbon  
 5 Electronic member  
 9 Suction head  
 10 Rail  
 12 Protrusion (rib)  
 13 Feeding hole  
 15 Ribbon feeding hook  
 16 Ribbon feeding roller

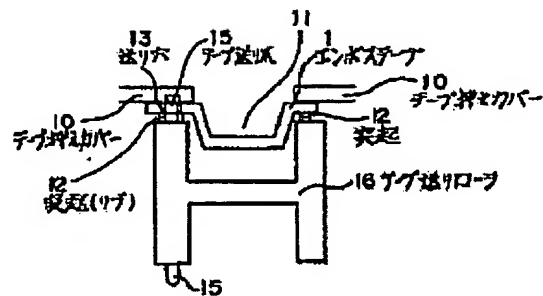


Figure 6

- Key: 1 Emboss ribbon  
 10 Ribbon pressing cover  
 12 Protrusion (rib)  
 13 Feeding hole  
 15 Ribbon feeding hook  
 16 Ribbon feeding roller

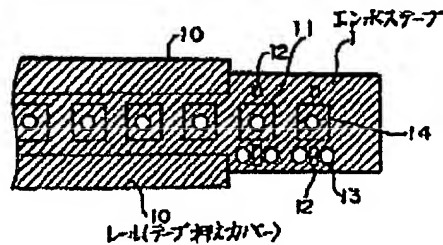


Figure 7

- Key: 1 Emboss ribbon  
10 Rail (ribbon pressing cover)

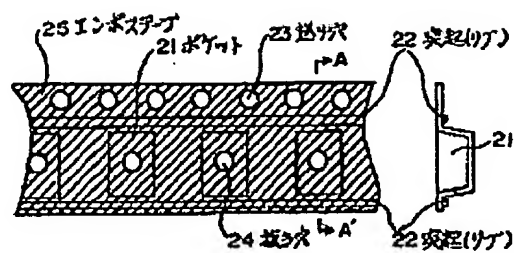


Figure 8

- Key: 21 Pocket  
22 Protrusion (rib)  
23 Feeding hole  
24 Vent hole  
25 Emboss ribbon

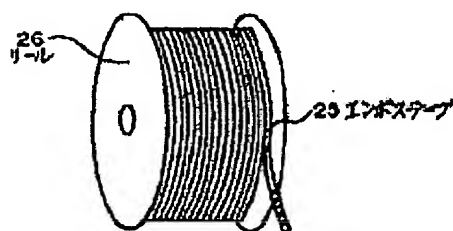


Figure 9

- Key: 25 Emboss ribbon  
26 Reel

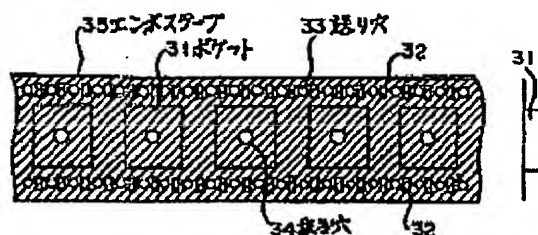


Figure 10

- Key: 31 Pocket  
33 Feeding hole  
34 Vent hole  
35 Emboss ribbon

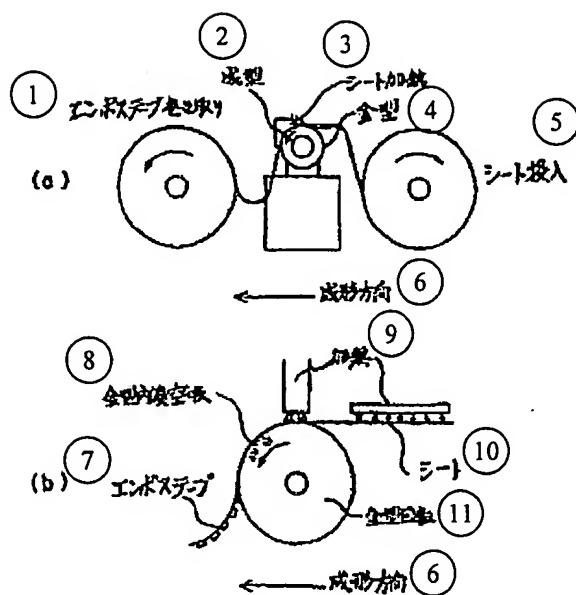


Figure 11

- Key:
- |    |                                 |
|----|---------------------------------|
| 1  | Winding up of emboss ribbon     |
| 2  | Molding                         |
| 3  | Sheet is heated                 |
| 4  | Mold                            |
| 5  | Loading of sheet                |
| 6  | Molding direction               |
| 7  | Emboss ribbon                   |
| 8  | Air suction [illegible] in mold |
| 9  | Heating                         |
| 10 | Sheet                           |
| 11 | Rotation of mold                |

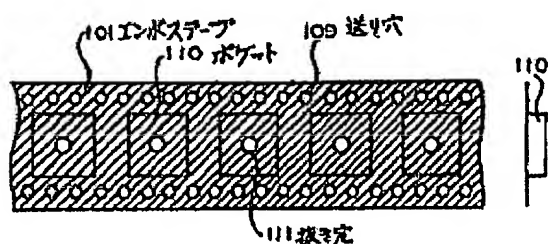


Figure 12

- Key:
- |     |               |
|-----|---------------|
| 101 | Emboss ribbon |
| 109 | Feeding hole  |
| 110 | Pocket        |
| 111 | Vent hole     |

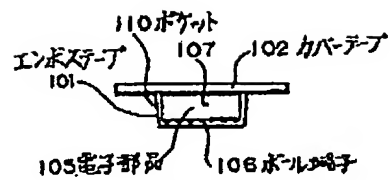


Figure 13

- Key: 101 Emboss ribbon  
 102 Cover ribbon  
 105 Electronic member  
 106 Ball terminal  
 110 Pocket